PREY CONSUMPTION BY *PRISTHESANCUS PLAGIPENNIS* WALKER (HEMIPTERA: REDUVIIDAE) DURING DEVELOPMENT

D.G. JAMES

Yanco Agricultural Institute, New South Wales Agriculture, Yanco, N.S.W., 2703

Abstract

Prey consumption by individual assassin bugs *Pristhesancus plagipennis*, during development ranged from 94-172 prey items (adult *Drosophila* sp., larval *Tribolium castaneum* (Herbst) and *Tenebrio molitor* (L.), and nymphal *Biprorulus bibax* Breddin and *Nezara viridula* (L.)). Total consumption averaged 153.9, 127.6 and 117.3 at 22.5°, 25° and 30°C, respectively, although daily consumption was greater at 30°C (2.5) than at 25°C (2.0) or 22.5°C (1.3). The large size, long lifespan and voracity of this general predator suggest it may be an important regulator of insect populations in some ecosystems.

Introduction

The assassin bug, *Pristhesancus plagipennis*, is currently being evaluated as a component of integrated management of spined citrus bug, *Biprorulus bibax* (James 1992, 1994). *P. plagipennis*, a generalist predator, is found in a variety of crop ecosystems in Queensland and northern New South Wales. It preys on a large range of insects including bees (McKeown 1942) and true bugs (Illingworth 1921, Summerville 1931, Noble 1936). Hawkeswood (1990) recorded butterflies, beetles, flies and leafhoppers as prey for *P. plagipennis*. Feeding on moths, caterpillars and mealybugs has also been observed (James unpublished observations). An apparent preference for bugs and beetles has been noted. An example occurs in coastal southern Queensland where *P. plagipennis* is commonly associated with the cotton harlequin bug, *Tectocoris diophthalmus* (Thunberg), on cottonwood trees (James unpublished observations). There is also a strong association between *P. plagipennis* and infestations of the stink bugs *B. bibax* (Summerville 1931, James 1992) and *Musgraveia sulciventris* (Stål) (Noble 1936) on citrus.

General predators have received little attention as biological control agents. They are often considered poor candidates precisely because they are polyphagous, are not synchronised with the pest and usually do not have a high potential for increase. However, evidence is now accumulating to suggest general predators can be important in biological control systems (e.g. Murdoch et al. 1985; McMurtry 1992).

The potential importance of assassin bugs as biological control agents has received even less attention than other general predators (Schaefer 1988). Most studies on reduviids have been conducted in India, with most concentrating on biology and ecology (eg. Abasa 1981, Vennison and Ambrose 1989). Schaefer (1988) hypothesised that reduviids, being relatively large, consume a considerable number of prey during their lifetime. He also suggested that development through a great range of sizes (from first instar to adult) means that an assassin bug consumes a wider array of prey species than does a smaller predator. Given the paucity of information on

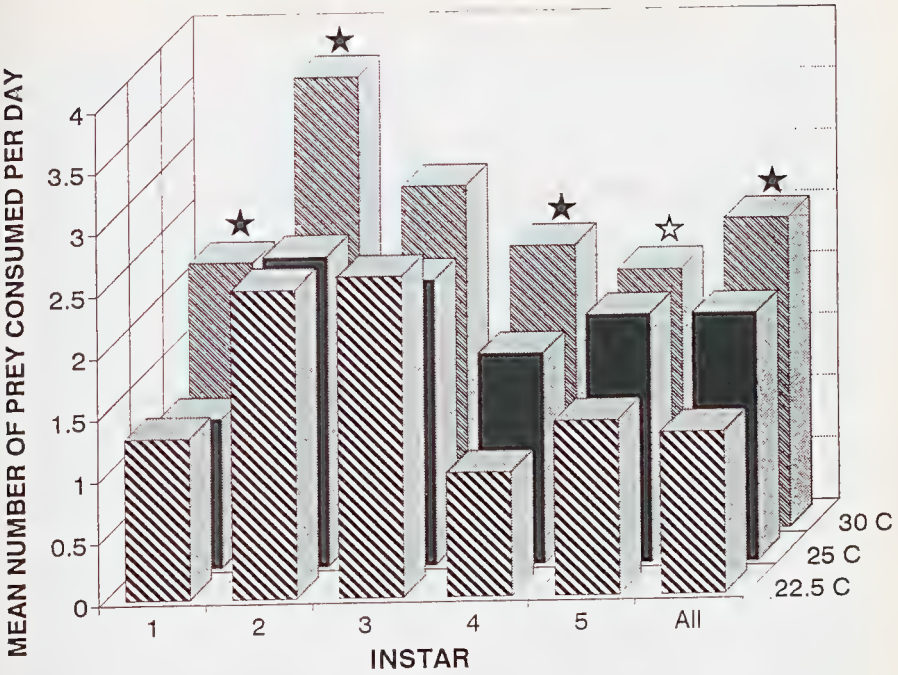

Fig. 1. Daily prey consumption by developing *P. plagipennis* at 22.5, 25 and 30°C.
★ Consumption significantly greater at 30°C than 22.5 or 25°C ($P < 0.05$)
☆ Consumption significantly greater at 30°C than 22.5°C ($P<0.05$)

Table 1. Prey consumption of *P. plagipennis* at 22.5, 25 and 30°C.

	22.5°C		25°C		30°C	
Instar	Mean No prey consumed	Range	Mean No prey consumed	Range	Mean No prey consumed	Range
1	24.8*	10 - 58	10	7 - 16	16.8	6 - 46
2	31.1*	20 - 44	20.3	14 - 30	22.2	12 - 31
3	41.4*	24 - 86	25.7	11 - 51	24.7	12 - 35
4	22.9	8 - 49	23.4	9 - 36	26.5	6 - 60
5	33.7	12 - 63	32.5	12 - 69	27.2	9 - 58
All	153.9*	116 -172	127.6	98 -152	117.3	94 -147

* Significantly greater consumption than for same stage(s) at the other temperatures ($P<0.05$)

reduviids is likely to vary considerably according to species size and prey size. *P. plagipennis* is one of the largest Australian reduviids (20-25 mm in length) and clearly consumes a considerable number of prey during its lifetime. No data have yet been collected on prey consumption by adults but laboratory observations indicate 1-2 items are consumed daily. With a potential feeding lifespan of 9-12 months (James unpublished observations) a single *P. plagipennis* could consume between 300 and 600 individual prey items during its life. Even at the lower end of this estimate it is clear that a resident population of *P. plagipennis* in a citrus orchard, for example, could have a significant impact on populations of prey insects. Although the generalist feeding nature of *P. plagipennis* will diminish its impact on particular prey species, the observed tendency to aggregate in habitats with large numbers of certain heteropterans (eg. *B. bibax*, *T. diophthalmus*) might enhance regulation of these bug species. A precedent is provided by species of the reduviid genus *Phonoctonus* which appear to "specialise" on cotton stainers *Dysdercus* spp. and are considered valuable in biological control of these pests (Fadare 1978; Schaefer and Ahmad 1987). The question of prey preference should be studied in *P. plagipennis*.

Although preliminary and derived under laboratory conditions, the data presented here do indicate the voracity of *P. plagipennis* and its potential importance as a regulator of insect populations in natural and agricultural ecosystems. *P. plagipennis* is an abundant bug in inland and coastal Queensland and northern New South Wales, whose role in natural regulation of pest populations deserves greater study.

Acknowledgments

I thank Renay Heffer for assistance in rearing bugs and collecting data. The Horticultural Research and Development Corporation provided financial assistance.

References

ABASA, R.O. 1981. *Harpactor tibialis* Stål (Hemiptera: Reduviidae), a predator of *Ascotis reciprocaria* Wlk in Kenya coffee estates. *Kenya Journal of Science and Technology* (B) **2:** 53-55.

FADARE, T.A. 1978. Efficiency of *Phonoctonus* spp. (Hemiptera: Reduviidae) as regulators of populations of *Dysdercus* spp. (Hemiptera:Pyrrhocoridae). *Nigerian Journal of Entomology* **1:** 45-48.

HAWKESWOOD, T.J. 1990. Some notes on three species of Australian Reduviidae (Hemiptera). *Victorian Entomologist* **20:** 99-102.

ILLINGWORTH, J.F. 1921. The linear bug *Phaenacantha australica* Kirkaldy: a new pest of sugar-cane in Queensland. *Queensland Bureau of Sugar Experiment Stations, Division of Entomology* Brisbane. Bulletin No 14.

JAMES, D.G. 1992. Effect of temperature on development and survival of *Pristhesancus plagipennis* (Hemiptera: Reduviidae). *Entomophaga* **37:** 259-264.

JAMES, D.G. 1994. The development of suppression tactics for *Biprorulus bibax* (Heteroptera: Pentatomidae) as part of an integrated pest management program in inland citrus of south-eastern Australia. *Bulletin of Entomological Research* **84:** 31-38.

McKEOWN, K.C. 1942. *Australian Insects*. Royal Zoological Society of New South Wales. Sydney.

McMURTRY. J.A. 1992. Dynamics and potential impact of "generalist" phytoseiids in agroecosystems and possibilities for establishment of exotic species. *Experimental and Applied Acarology* **14:** 371-382.

MURDOCH, W.M., CHESSON, J. and CHESSON, P.L. 1985. Biological control in theory and practice. *American Naturalist* **125:** 345-366.

NOBLE, N.S. 1936. *Pristhesancus papuensis* Stål; an assassin bug. *Journal of Australian Institute of Agricultural Science* **2:** 124-126.

SCHAEFER, C.W. 1988. Reduviidae (Hemiptera: Heteroptera) as agents of biological control. *Biocovas* **1:** 27-33.

SCHAEFER, C.W. and AHMAD, I. 1987. Parasites and predators of Pyrrhocoroidea (Hemiptera) and possible control of cotton stainers by *Phonoctonus* spp. (Hemiptera: Reduviidae). *Entomophaga* **32:** 269-275.

STRIDE, G.O. 1965. On the biology of certain West African species of *Phonoctonus* (Hemiptera:Reduviidae), mimetic predators of the Pyrrhocoridae. *Journal of the Entomological Society of Southern Africa* **19:** 12-28.

SUMMERVILLE, W.A.T. 1931. The larger horned citrus bug. *Queensland Department of Agriculture and Stock. Division of Entomology and Plant Pathology Bulletin* No 8.

VENNISON, S.J. and AMBROSE, D.P. 1989. Biology and predatory potential of a reduviid predator, *Oncocephalus annulipes* Stål (Hemiptera: Reduviidae). *Journal of Biological Control* **3:** 24-27.